

12/5/16 "Those who look outside dream, those who look inside awaken." -Carl Jung

HW: Implicit Differentiation w/s #1, 2, 7, 21, 22  
Test 2 on Tuesday 12/20

AIM:

How do we write equations of tangent lines to curves using Implicit Diff?

Warm Up:

- 1) Find an equation for the line tangent to
- $\frac{x}{x+2y} = y$
- 
- in the 4th Quadrant when
- $x=1$
- .

Point:

Points

$(1, -1)$  and  $(1, \frac{1}{2})$   
In 4th Quad      In 1st Quad

$$\begin{aligned} 1 &= y(1+2y) \\ 1 &= y+2y^2 \\ -1 &\quad -1 \\ \hline 0 &= 2y^2 + y - 1 \\ 0 &= 2y^2 + 2y - 1y - 1 \\ 0 &= 2y(y+1) - 1(y+1) \\ 0 &= (2y-1)(y+1) \\ y &= \frac{1}{2} \quad y = -1 \end{aligned}$$

Slope:

$$\frac{d}{dx} \left( \frac{x}{x+2y} = y \right) = \left[ \frac{(x+2y)(1) - x(1+2\frac{dy}{dx})}{(x+2y)^2} = \frac{dy}{dx} \right]$$

Plugging in  
the point  $(1, -1)$   
makes finding  
the slope easiest

$$\frac{1+2(-1) - 1(1+2\frac{dy}{dx})}{(1+2(-1))^2} = \frac{dy}{dx}$$

$$-1 - 1 - 2\frac{dy}{dx} = \frac{dy}{dx}$$

$$\frac{dy}{dx} = -\frac{2}{3}$$

$$\begin{aligned} -2 - 2\frac{dy}{dx} &= \frac{dy}{dx} \\ +2\frac{dy}{dx} + 2\frac{dy}{dx} & \\ -2 &= 3\frac{dy}{dx} \end{aligned}$$

Point  
 $(1, -1)$

Slope  
 $-\frac{2}{3}$

$$y+1 = -\frac{2}{3}(x-1)$$



